

- ① Let 1 byte = 8 bits then
16 byte = 128 bits
4 × 32-bit = 128 bits

Therefore four 32-bit integers is stored in a 16-byte cache line

②

(a) for (I=0; I < 8000; I++)
for (J=0; J < 8; J++)

$$A[I][J] = B[J][0] + A[J][I];$$

Temporal locality:

This refers to the tendency for a processor to access memory locations that have been used recently. For example, when an iteration loop is executed, the processor executes the same set of instructions repeatedly.

(b) for (J=0; J < 8; J++)

for (I=0; I < 8000; I++)

$$A[I][J] = B[J][0] + A[J][I];$$

Temporal locality: I, J

(3)

a) for (I=0; I<8000; I++)

for (J=0; J<8; J++)

A[I][J] = B[J][0] + A[J][I];

Spatial locality-

This refers to the tendency of execution to involve a number of memory locations that are clustered. This reflects the tendency of a processor to access instructions sequentially.

Spatial locality also ~~refers~~ reflects the tendency of a program to access data locations sequentially such as when processing a table of data.

Therefore in the above code the spatial locality

is Spatial locality is $A[I][J]$

2) $\underline{\underline{5}}$
 for (I = 1: 8000)
 for J = 1: 8
 A(I, J) = B(J, 0) + A(J, I);
 end
 end

(b) Temporal locality

This refers to the tendency for a processor to access memory locations that have been used recently. For example, when an iteration loop is executed, the processor executes the same set of instructions repeatedly.

Temporal locality: I, J, B(J, 0)

(c) for J = 1: 8
 for (I = 1: 8000)
 A(I, J) = B(J, 0) + A(J, I);
 end
 end

(d) Temporal locality: I, J

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Step 1:

e) For (I = 1:8000)

for J = 1:8

$$A(I, J) = B(J, 0) + A(J, I)$$

end

end.

Step 2

Spatial locality

This refers to the tendency of execution to involve a number of memory locations that are clustered. This reflects the tendency of a processor to access instructions sequentially. Spatial locality also reflects the tendency of a program to access data locations sequentially, such as when processing a table of data. Therefore in the above code the spatial locality is

Spatial locality = $A(I, J), A(J, I), B(J, 0)$

Step 3

b)

for J = 1:8

for (I = 1:8000)

$$A(I, J) = B(J, 0) + A(J, I)$$

end

end